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PROTECTED

Could coating flaxseed boost Omega 3 in beef?

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MANDAN, N.D. - Scientists in the region are working to boost the levels of Omega 3 fatty acids in beef, and some think they may be a year or two away from significant improvements.

"Right now, levels of enrichment are fairly low, and we'd like to see them higher," says Scott Kronberg, a livestock nutritionist who works with the Agricultural Research Service at the Northern Great Plains Research Lab in Mandan, N.D. "Hopefully in a year or two, by feeding 'protected' flaxseed, we can see them higher."

Kronberg, was a professor at South Dakota State University before moving to Mandan about five years ago, arrived at the lab thinking he was going to be working on greenhouse gas issues.

"I got into this Omega 3 beef issue because I'd read some health newsletters on it," he says.

Many doctors encourage their cardiovascular patients to consume Omega 3, he says. It's the same compound found in tuna, salmon and other cold-water fish. Fish consumption is not high in much of the Upper Midwest and the rest of the country.

Another source of Omega 3 is flax, a big crop in North Dakota. Flax oil is available in organic and certain health stores, but it is sometimes expensive and doesn't have a long shelf life in the form of salad dressings.

"I'm arguing that we should be enriching various foods we eat baked goods, but we could put a lot more in salad dressings, pork, chicken, milk, yogurt, eggs."

And very importantly beef.

Many beef producers are looking at value-added niche markets. Among them is the fledgling Dakota Beef Cooperative, which this past summer announced a feasibility study for a kill plant that would handle "natural" beef and perhaps Omega 3 beef.

Carrying it through

Research on the flax and Omega 3 in beef has perked up during the past three or four years.

In 2003, Kronberg ran a pilot trial, feeding flaxseed to Hereford steers that also were grazing corn. "We put it in a feed bunk and they came up to eat it."

The trial definitely elevated the level of Omega 3. Kronberg still is trying to elevate it more while keeping the meat palatable. Most of the Omega 3 in beef isn't in the white, visible fat either the back fat or the so-called marbling.

"Most of it is in the cell membranes," Kronberg says. "Every cell is surrounded by membranes, and they're made up largely of fatty acids."

Kronberg has been involved with studies of steaks from cattle that had been fed for about 100 days with Omega 3 flaxseed. None of the Omega 3s were lost when the steaks were grilled to medium.

Kronberg notes you don't have to have meat samples to know whether Omega 3 is available to the muscle cells. "If it's in the blood, they're available to the muscle cells."

One issue is whether meat that's high in Omega 3 will have a lower shelf life."People wonder if the meat will go bad fast," Kronberg says. "We can prevent that by supplementing with the vitamin E. Potentially, we might be able to increase shelf life more if we can reduce how much the microbes change it. We're also looking at feeding it longer more months before the animal is harvested."

Kronberg isn't alone in his flaxseed studies.

Vern Anderson, a North Dakota State University researcher in Carrington, and Greg Lardy, a beef extension specialist with NDSU in Fargo, also are working on flax trials. It's been shown that flax is a high-fat, high-protein ingredient that improves animal performance, especially in the feedlot.

Two years ago, NDSU researchers concluded that flax fed at 8 percent of total feedstuffs showed pretty dramatic increases in daily gain rates, Anderson says. A year ago, another NDSU study showed that grinding or rolling had the most effect on flax intake efficiency.

A study is getting under in the next few weeks, looking at the timing of flax feeding whether it's weaning, just a few weeks before marketing or through the entire feeding period.

"Because of the cost of flax, we're thinking we might feed it for a short time and get a performance boost from the nutrient density," Anderson says.

Travis Maddock, an NDSU animal scientist, did doctoral work on Omega 3 effects. The studies didn't verify more promising work in Kansas, although there are different types of cattle and different feeding scenarios.

"We could measure substantial increases in Omega 3s in the animals that were fed flax," Lardy says. "The work in Kansas showed feeding to stressed calves resulted in more cattle grading choice. We didn't find that. We also did some work with consumer taste panels, which showed no dramatic changes."

Anderson says flax is a good feed, regardless of the Omega 3 change. "I think we have to do better to make it biologically practical as a source of Omega 3," Anderson says.

Eric Murphy, a biochemist working with fatty acids at the University of North Dakota School of Medicine and Murphy's postdoctoral associate, has analyzed bloods samples for the fatty acid levels for both Kronberg's and NDSU trials.

Packing in Omega 3

The challenge of high-Omega 3 beef is of course different than for other meat animals.

Chickens and pigs have single stomachs and don't have these microbes in their stomachs, so much of what they eat goes directly into the muscle tissues.

In a ruminant, there are four stomachs. Two of the stomachs are full of microbes that digest forage. "They also take these polyunsaturated fatty acids from plant sources sunflower, soybean, flax and they convert those into fatty acids. That's why there's so much saturated acids in beef and lamb," Kronberg says.

Flax is very high in alpha linolenic acid.

"Linolenic acid is the one Omega 3 that plants can make," Kronberg says. "The other ones, like in fish, are slightly different Omega 3 fatty acids. When the ruminant animal grazes grass and ingests the alpha linolenic acids, the microbes convert most of that into saturated fatty acids."

One of the things Kronberg is working on are ways to reduce the hydrogenation of the Omega 3 fatty acids and turning those into saturated fats. "The idea is that if we could protect more, we wouldn't have to feed as much and we could get more Omega 3-enriched beef easier."

Another issue is to make sure that the levels of Omega 3 feeding aren't increased so much that the meat has a fishy taste.

Currently, more than 90 percent of the Omega 3 consumed by cattle is lost to the microbes. It's a waste of the Omega 3 in the flaxseed.

The issue also relates to cost.

"It all comes down to dollars and cents. You could feed it for longer and increase it in the meat. We still don't know the process of maximizing the amount in beef."

Protecting the Omega 3

Australian and English scientists have been figuring out some ways to protect the Omega 3 from the microbes in the ruminant stomachs.

The theory is that the flaxseed might be sprayed with formaldehyde or some other compound, which could kill the microbes. Work on this theory has been going on for some 20 years, but Kronberg sees problems.

"Whether it's truly dangerous for people to eat isn't clear, but I have a problem with the perception of eating food that had anything to do with formaldehyde, and let's face it that's important," Kronberg says. "People who might be more interested in Omega 3 might be the most concerned. We're looking for something that's more acceptable."

An alternative compound Kronberg has been testing is tannin. The tannin product comes from different sources, but the source of this tannin is the quebracho, a South American hardwood tree. The product comes in a thick syrup or dry powder that goes into solution with water and look like a red wine.

So far, tests have been encouraging.

"I'm concluding that if we can get more in the blood, we'll see more in the muscle," Kronberg says. "We don't know how much more, but definitely more, significantly more.

"If we see any of these protections work, then we'll have to feed for two to four months to see if we verify this. We have to take the next step to see if we can utilize it more."